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Synchronising Xsens Systems with TMSI Porti

Step – by – step manual

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1 Synchronization Workflow



The steps described below show how to make it possible for Xsens Awinda or Sync Station to send a trigger pulse to TMSI's EMG system Porti. Using Xsens systems, a trigger pulse is recognized in the digital channel of TMSI's Polybench software (the software reading data from the Porti, Mobi, Reva and Mobita systems). The tested synchronization was based on the Porti system.

1. Perform the calibration and get both systems fully set.
2. Set the specifications for synchronization in both systems and connect sync cable(s)
3. Start the recording on the slave software. The slave software will wait for a trigger from the Master software to start recording.
4. Start the recording on the Master software. Then, both systems will start recording at the same time.
5. Stop recording on the master software. Then both systems will stop recording at the same time.

Depending on the type of synchronization performed different specifications are required for both systems. A detailed explanation of the different characteristics according to the desired synchronization are described below.

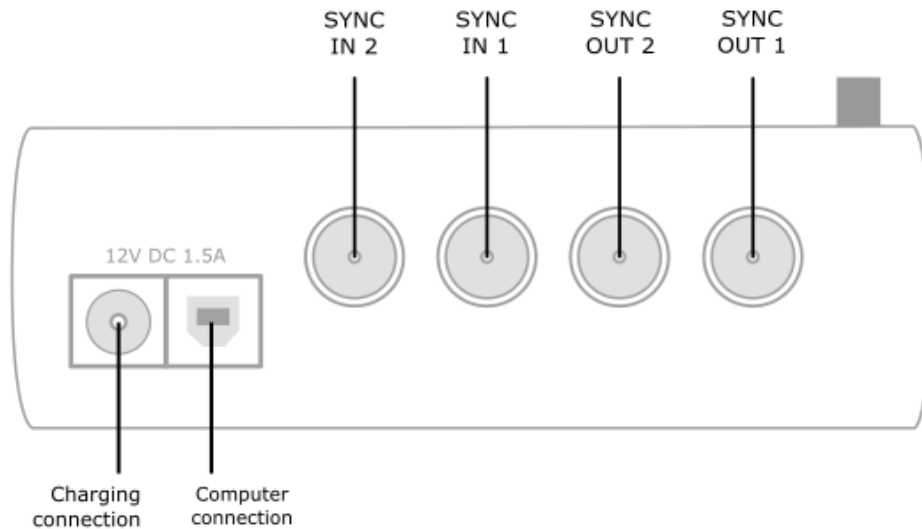
This document is written to synchronize the Xsens Awinda system. However, most of the steps performed in the MVN software are the same for the MVN Link system. You can see the differences in the setup of the system in the last chapter of this document "Using MVN Link to synchronize".

2 Required Hardware

TMSi Porti Hardware	XSens Hardware
<ul style="list-style-type: none">• TMSi hardware: TMSi Porti System with trigger input• Micro-coax connector 	<ul style="list-style-type: none">• MVN Awinda or MVN Link• Awinda station  <p data-bbox="799 725 1361 779">Figure 1 - Awinda Station. 4 BNC ports: SYNC IN 1, SYNC IN 2, SYNC OUT 1, SYNC OUT 2.</p> <ul style="list-style-type: none">• micro coax connector on one end and a BNC connector on the other end.

3 Hardware connections scheme

Awinda Station/Sync Station



The Xsens Awinda and Sync Stations have four BNC connectors, with two Sync IN and two Sync OUT possibilities. These hardware connections are shown in Figure 1.

3.1 Sync IN

The Sync IN ports are for a third party device to send a signal to the Awinda or Sync Station. The Awinda or Sync Station can detect polarity changes on the input lines. When a trigger is detected on one of the input lines, the Awinda or Sync Station can be configured to perform a specific action.

3.2 Sync OUT

Sync OUT enables the Xsens system to send a trigger pulse via the Awinda or Sync Station to third party hardware. As with Sync IN, a combination of events are possible, based on a number of parameters.

3.3 Pulse Polarity

A trigger may be a rising or falling edge, as illustrated in the figure below.

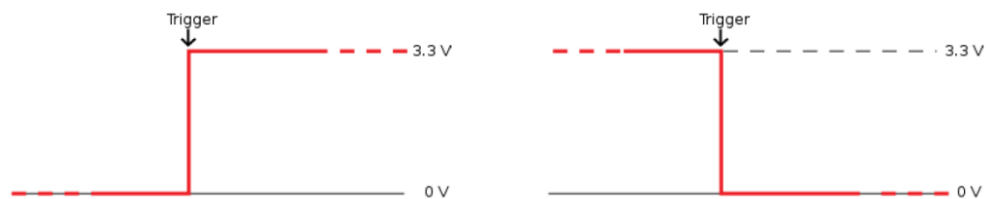


Figure 2 - Polarity: Rising/ falling edge (Sync IN) or positive / negative pulse (Sync OUT).

4 MVN Analyze as Master and as TMSI slave

4.1 Start and Stop a recording

4.1.1 Software Setup: Polybench

- Configure the Polybench software in the usual way.
- Ensure that the digital channel is activated.

Each time the record button in Xsens software is clicked, a pulse is recorded in the Polybench software.

The image below shows a zoomed image of only the digital channel, displaying the sync pulse in Polybench software.

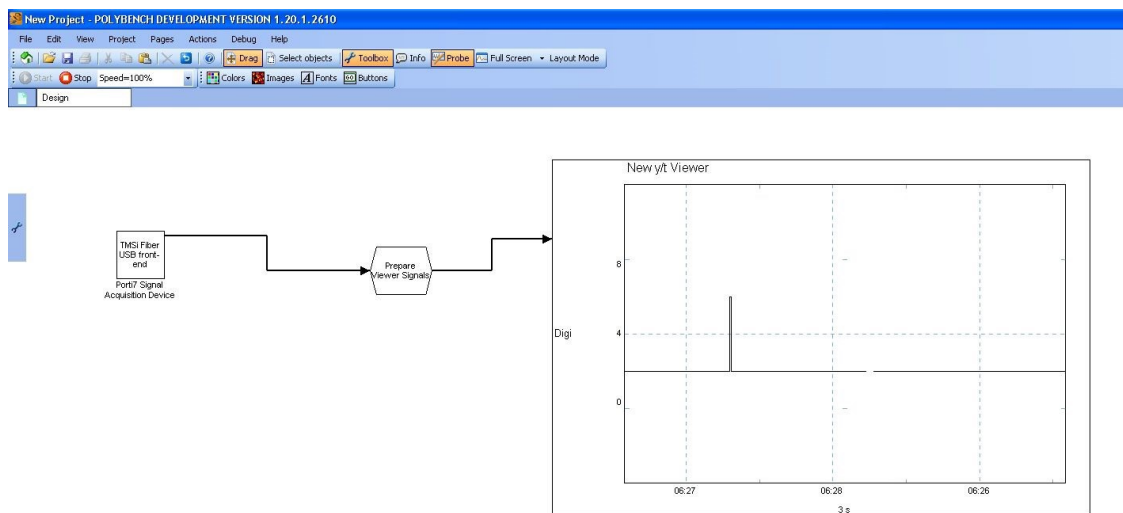


Figure 4 - Sync pulse recorded in TMSI Polybench software.

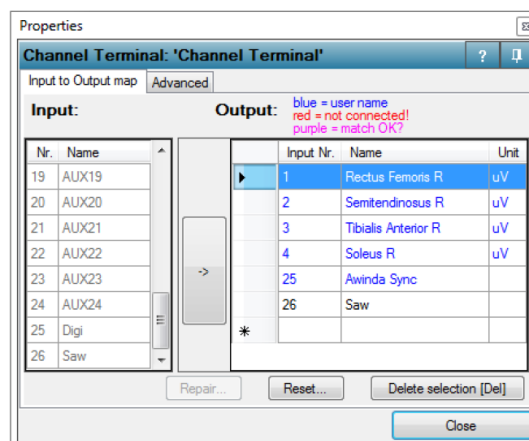
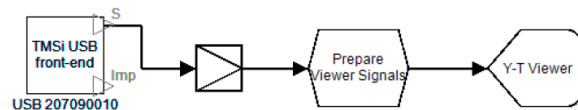


Figure 3 - Example of a Polybench application indicating how to read the Awinda sync pulse. The sync pulse of this example is available on channel 25 (Digi channel).

4.1.2 Xsens Software

Initialize the synchronization setting of the Xsens software using the following settings.

1. In the Configuration window, in the Sync tab you should select:

Strat recording (out)	Stop Recording (out)
<ul style="list-style-type: none">• Out 1• Polarity: Falling Edge• Skip Factor = 0• Skip First = 0• Pulse width = 10 ms• Trigger once: uncheck	<ul style="list-style-type: none">• Out 2• Polarity: Falling Edge• Skip Factor = 0• Skip First = 0• Pulse width = 10 ms• Trigger once: uncheck

The pulse width given above is an example that was tested for this particular setup. The user may find that it should be changed depending on the update rate of the MTw system and the sample frequency of the third party system. Make sure that the pulse width is at least $1/F_s$ wide. So for example when sampling at 1000Hz the trigger pulse width should be at least 1ms or 1000 μ s. Continue with setting up the Xsens system.

5 Using the Link System

To use the XSens Link system instead of the Awinda system you need to have an Awinda Station. Then you should activate the Awinda station in the "Motion Capture Configuration window" by turn on the bottom on the sync station configuration tab. In this tab you can find all the details described above.

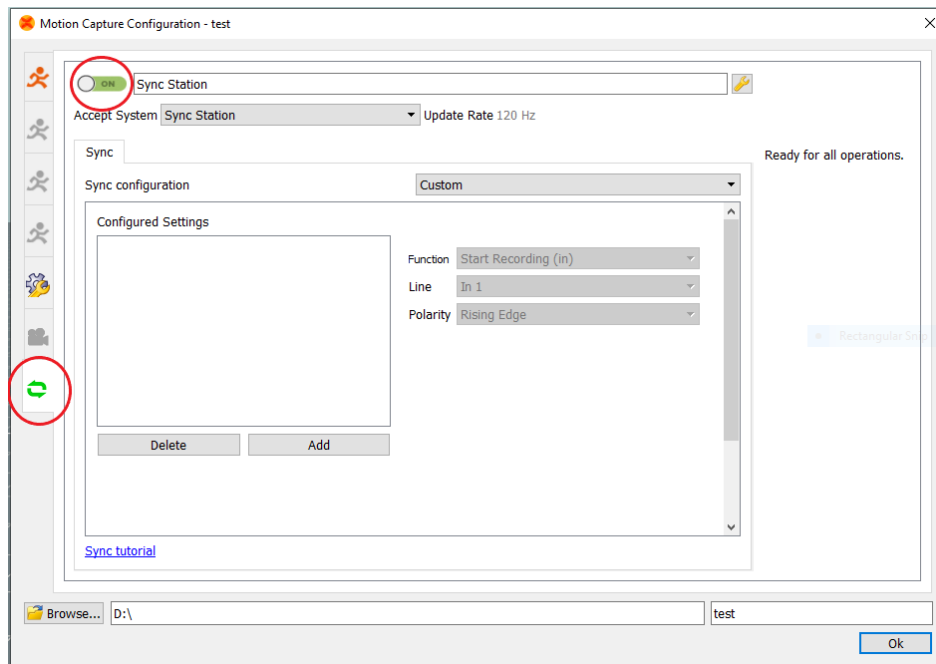


Figure 5 - Motion Capture configuration window in MVN Analyze. Indications to activate the Awinda station as sync station with the Link system.

Note: When using the Xsens Link system, which has an output rate of 240Hz, you will still need to use an Awinda Station to send synchronization signals. As our Awinda station has a maximum frame rate of 120Hz, you will realise that the maximum frame rate that the output signal will have is 120Hz. Practically, this entails that every other frame of Xsens will be synchronize with the frame of the other party system. This still gives an optimal synchronization between both systems.

If you would like to have both systems with the same sampling frequency you should downsample the file while export. To do so follow the following steps:

- Go to "File" tab - > "Export"
- Select the format you would like to export the data
- Click "Show options" and select the right "Exporter frame skip (for downsampling)" value.